Attachment 1
Standard Specifications

SUBSECTION 201.00: CLEARING AND GRUBBING

201.01 GENERAL

A. DESCRIPTION - This work shall consist of clearing, grubbing, removing, burning, burying, and otherwise disposing of vegetation and debris within the clearing limits as designated on the Drawings and by the Engineer. Vegetation and objects designated to remain shall be preserved free from injury and defacement.

If any evidence of aboriginal activity or occupation is encountered, the Contractor shall immediately stop work and notify the Engineer, who shall contact the proper state authorities for an assessment of the significance of the resource.

The work shall be classified as follows:

1. Clearing. Clearing shall consist of the felling of trees and disposal of stumps, brush, windfalls, logs, limbs, sticks, piles of sawdust, rubbish, debris, vegetation, and other objectionable matter existing within the clearing limits or that interfere with excavation and embankment.

2. Grubbing. Grubbing shall consist of the removal and disposal of roots, stumps, stubs, rock, roots, debris, and other objectionable matter from the grubbing limits.

3. Clearing and Grubbing. Clearing and grubbing shall consist of performing both clearing and grubbing as set forth above.

4. Disposal. Disposal shall consist of removing, burning, burying, or otherwise disposing of the refuse accumulations from clearing, grubbing, or clearing and grubbing operations. The refuse resulting from these operations shall be disposed of in the same manner as debris described in Subsection 502.00, Debris and Structure Removal.

201.02 MATERIALS

Not applicable.

201.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - Clearing, grubbing, or clearing and grubbing shall be done at times and in a manner that the surrounding vegetation, adjacent property, and anything designated to remain shall not be damaged. Dragging, piling, disposing of debris, and other work that may be injurious to vegetation shall be confined to areas that carry no vegetation or that will be covered by embankments or disturbed by excavations.

Vegetation adjacent to streams, ponds, or lakes shall be preserved and protected from injury unless the vegetation conflicts with construction operations and is designated by the Engineer to be removed. If any vegetation designated to be preserved becomes damaged or destroyed by the Contractor, it shall be replaced to the satisfaction of the Engineer at no cost to the Owner.

The Engineer will designate trees, shrubs, plants, or other objects that are to remain. The Contractor shall preserve all objects so designated.

The Contractor shall not injure trees, shrubbery, vines, plants, grasses, and other vegetation growing outside of the slope limits of excavation and embankment. The Contractor shall paint all cut or scarred surfaces of trees or shrubs selected for retention. The paint shall be an approved asphaltum base paint prepared especially for tree surgery.

Where scour is likely to occur, resulting from clearing or grubbing conducted in advance of excavation work, temporary erosion control setting basins shall be constructed prior to any scour occurring.

B. CLEARING - All areas within the neat lines of cut or fill areas shall constitute the clearing limits.

Unless specifically designated to be saved, all trees, stumps, brush, windfalls, logs, and other objectionable matter occurring within clearing limits shall be cut off and disposed of. All stumps within the clearing limits and all trees, the stumps of which are not to be grubbed, shall be cut not more than the diameter of the stump, and in any instance not more than 12 inches, above the ground.

The refuse resulting from the clearing operation shall be removed, as specified in Subsection 502.00, Debris and Structure Removal, to a location designated by the Engineer, or, if no site is specified, then the Contractor shall secure a waste site. The Contractor shall not burn on the site unless he has obtained permission as specified in Subsection 502.00, Debris and Structure Removal. In all cases, the authority to burn shall not relieve the Contractor in any way from damages which may result from his operations. In no case shall any material be left on the project, shoved onto abutting private properties, or be buried in embankments or trenches on the project.

C. GRUBBING - All areas within the neat lines of cuts, and all areas to be covered by embankments less than 3 feet in height shall constitute the grubbing limits.

All stumps, roots, logs, or other timber more than 3 inches in diameter, and all brush, matted roots, rock, and other debris within the grubbing limits not suitable for roadway foundation shall be pulled or otherwise removed to a depth of not less than 6 inches below the original ground or 12 inches below roadway subgrade.

All material resulting from the grubbing operations shall be disposed of as specified in Subsection 502.00, Debris and Structure Removal. All depressions below subgrade, or below the final surface of the ground resulting from the grubbing operations shall be backfilled with suitable material as specified in the Subsection 202.00, Excavation and Embankment.

D. CLEARING AND GRUBBING - Clearing and grubbing shall be done in accordance with the provisions of B and C above.

SUBSECTION 202.00: EXCAVATION AND EMBANKMENT

202.01 GENERAL

A. DESCRIPTION - All excavation, embankment, and grading work shall be in accordance with these Specifications and in reasonably close conformity with the lines, grades, and elevations shown on the Drawings or as established by the Engineer.

1. Excavation. This work shall consist of performing all operations necessary to excavate, grade, and satisfactorily dispose of all materials encountered during excavation at the areas designated on the Drawings. The work shall include roadway excavation, structure excavation, excavation of mine working, ditch or channel excavation, any general unclassified excavation, and all other excavation not covered under other subsections of these Standard Specifications.

2. Embankment. This work shall consist of performing all operations necessary to prepare, backfill, compact, and grade all areas requiring embankment or fill as shown on the Drawings. The work shall include roadway embankment, structure embankment, dike embankment, backfilling mine workings and depressions, cut and fill terracing, and all other backfilling or embankment not covered under other subsections of these Standard Specifications.

B. SUBMITTALS - The Contractor shall provide the following submittals in accordance with the Supplementary Conditions:

* Moisture-density characteristics using AASHTO T-99 for embankment or backfill material and excavated subgrades. As material types change during construction, additional moisture-density characteristics may be required by the Contractor or Engineer.

* Backfill imported from an off-site source shall be tested and submitted, including source location, gradation, and moisture-density characteristics.

C. REFERENCE STANDARDS - Maximum density shall be determined by AASHTO T-99 and is defined as the maximum dry weight in pounds per cubic foot obtained when a material is mixed with different percentages of water and compacted in a standard manner. The percentage of water at which maximum density is obtained is termed the optimum moisture content.

The percent compaction is defined as the density of the compacted layer expressed as a percentage of the maximum density of the material when tested in accordance with these Specifications.

The percentage of compaction is computed by the formula:

$$\text{Percent compaction} = \frac{\text{Field Density}}{\text{Maximum Density}} \times 100$$

202.02 MATERIALS

A. ON-SITE MATERIALS - Suitable materials for embankments and backfill shall be taken from designated excavation areas. Stumps, trees, rubbish, vegetation, frozen lumps, or other unsuitable materials shall not be placed in embankments. Large rock will only be considered suitable if it does not adversely affect the requirements for compaction.

B. ROADWAY MATERIALS - Requirements for roadway materials are specified under Section 800, Surfacing - Aggregate, Base Courses, and Pavement of the Standard Specifications.

C. IMPORTED MATERIALS - Imported backfill materials shall meet the requirements specified in Section 202.02-A above and shall be approved by the Engineer prior to delivery of the material to the project. All areas used as a material source or for stockpiling shall be reclaimed by the Contractor at his cost unless such areas are designated as Approved Areas of Disturbance as defined in the Supplementary Conditions.

202.03 CONSTRUCTION REQUIREMENTS

A. GENERAL - All excavation and embankment shall be considered unclassified and shall consist of the removal or disposal of any and all material encountered regardless of type or nature obtained within the construction limits designated on the Drawings.

All suitable materials removed from excavation shall be used insofar as possible for backfill and in embankments.

B. SITE PREPARATION - All areas scheduled for excavation and embankment shall be cleared and grubbed in accordance with Subsection 201.00, Clearing and Grubbing.

Prior to excavation and embankment work, all suitable topsoil and subsoil in the scheduled work areas shall be salvaged in accordance with Subsection 310.00, Cover Soil.

C. LINE AND GRADE CONTROL - Prior to excavation, backfill, grading, and embankment operations, the Contractor shall perform all necessary surveys for control of line and grade and establish stable and protected monuments for reference throughout the construction period. A sufficient number of such monuments shall be provided throughout the work to permit verification of the work within the tolerances specified.

D. EXCAVATION

1. General. The Contractor shall utilize excavating equipment appropriate for the work being performed. The method of excavation shall be the Contractor's responsibility. All methods and equipment used shall result in finished work meeting the construction tolerances specified. No work shall be performed beyond the construction limits without prior written approval from the adjoining landowners and the Engineer.

2. Dewatering. Ground water encountered during excavation shall be removed to avoid interfering with any construction activity. The cost of dewatering operations shall be merged with and considered part of the excavation cost.

3. Shoring, Sheeting, and Bracing. The Contractor shall do all shoring, bracing, and tight sheeting required to prevent caving and to protect his workmen, in accordance with the Occupational Safety and Health Regulation Requirements, and to protect adjacent

property and structures. No separate payment shall be made for these items and the cost thereof shall be considered part of the excavation cost unless otherwise shown or specified for the project.

4. Surplus and Waste Material. During excavation, where the ground foundation for embankments is composed of muck or other unstable materials, such materials shall be removed to the depth shown on the Drawings or as determined in the field by the Engineer and satisfactorily disposed. All holes created by removal of soft or unstable material shall be backfilled as specified for "Embankment". Backfill shall be obtained from the most select material encountered in excavation and shall be paid for only as is "Unclassified Excavation", unless otherwise approved in writing.

   All excavated material not used as mentioned above shall be used for embankment backfill or shall be wasted and disposed of by the Contractor at an approved disposal site. Finding disposal areas, placing waste material in these areas, and final leveling and cleanup of these disposal areas to the satisfaction of the property owner involved shall be entirely the Contractor's responsibility.

   When unsuitable material or debris is encountered during excavation, it shall be overexcavated until removed or until 1 foot below the established grade. Suitable material shall then be placed and compacted to bring the area to grade.

5. Maintenance of Subgrade and Drainage. During excavation, the subgrade shall be maintained in such a condition that it will be well drained at all times. Side ditches emptying from cuts to embankments shall be constructed to avoid damage by erosion.

   If it is necessary in the prosecution of the work to interrupt existing surface drainage, temporary drainage facilities shall be provided and maintained at the Contractor's expense until permanent drainage facilities are completed. The Contractor shall be responsible for, and shall take all necessary precautions to protect and preserve any and all existing subsurface drains, conduits, utilities, and other underground structures or parts thereof which may be affected by the construction, and which in the opinion of the Engineer may be properly continued in use without any change. The Contractor shall, at his own expense, repair all damage to facilities or structures which results from any of his operations or his negligence.

   Erosion checks shall be constructed perpendicular to ditches and as detailed on the Drawings.

E. STRUCTURE EXCAVATION

1. All Structures. Excavation adjacent to existing structures shall not commence until authorized by the Engineer.

   Excavations for structures or structure footings shall be to the lines and grades or elevations shown on the Drawings. They shall be of sufficient size to permit the construction of structures or structure footings. The elevations of the bottoms of footings, as shown on the Drawings, shall be considered as approximate.

   Boulders, wood, and any other unsuitable materials encountered in the excavation shall be removed and disposed of at an approved disposal site.

The Contractor shall notify the Engineer when each excavation is complete. Footings shall not be placed without first notifying the Engineer.

Excavations over 5 feet deep, except in solid rock, shall have side slopes of 1 to 1 or flatter, depending upon conditions at the individual site and in accordance with OSHA regulations. When the laying back of excavation slopes is precluded, supporting systems shall be used to retain the sides of excavations greater than 5 feet deep. Sides of excavations less than 5 feet deep shall also be effectively protected when hazardous ground movement may be expected.

Where concrete is to be placed on any excavated surface, special care shall be taken not to disturb the bottom of the excavation more than necessary. When the excavation is at the required depth, all water shall be pumped out for cleaning the foundation bed for inspection. All loose and disintegrated rock and thin strata shall be removed. All seams or crevices in rock strata shall be cleaned out and filled with concrete mortar. When the foundation material is soft or otherwise unsuitable, the unsuitable material shall be removed and the area shall be backfilled with approved compacted, granular material.

When foundation piles are used, the excavation of each pit shall be completed before the piles are driven. Foundation backfill shall be placed after the piles are driven. After the driving is completed, all loose and displaced material shall be removed, leaving a smooth, solid bed to receive the footing.

2. Cofferdams. Watertight cofferdams or cribs shall be used wherever waterbearing strata are encountered above the elevation of the bottom of the excavation. For this purpose, a cofferdam or crib is defined as an enclosed single- or double-wall braced structure with walls sheeted with timber, concrete or steel, and which shall extend well below the bottom of the excavation when practical. Earthen or rockfill dikes, dams, or embankments are not considered cribs or cofferdams for this purpose.

The design and construction of supporting systems, if used, shall be the responsibility of the Contractor in accordance with the following provisions. The Contractor shall submit 5 sets of drawings showing the proposed method of cofferdam or crib construction and 5 copies of the design calculations, fully annotated and referenced. The design calculations and drawings submitted shall bear the signature and seal of a State of Montana registered Professional Engineer.

Supporting systems shall be designed to withstand the expected loads and pressures, including surcharge, water and earth, which may occur during the period for which they are used. Surcharge, earth, and water pressure diagrams, and the method of supporting system analysis and design, shall meet accepted engineering practice. For new materials, the allowable working stresses of the materials shall be as recommended by the manufacturer for the construction conditions encountered. For used materials or when manufacturer's recommendations are not available or applicable, the allowable working stresses shall be as specified in AASHTO's "Standard Specifications for Highway Bridges".

In general, the interior dimensions of cofferdams shall be sufficient to give clearance for the construction of forms and the inspection of their exteriors, and to permit pumping outside of the forms. Cofferdams or cribs that are tilted or moved internally during the process of sinking shall be righted or enlarged to provide the necessary clearance.

When conditions make it impracticable to dewater the foundation before placing a footing, a concrete foundation seal with dimensions as necessary to resist uplift pressures shall be constructed. The concrete for the seal shall be placed as shown on the Drawings. The foundation shall then be dewatered and the footing placed. When weighted cribs are employed and the weight is utilized to partially overcome the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage such as dowels or keys shall be provided to transfer the entire weight of the crib to the foundation seal. When a foundation seal is placed under water, the cofferdam shall be vented or ported at low water level.

Cofferdams shall be constructed to protect green concrete against damage from sudden rising of water levels and to prevent damage to the foundation by erosion. Timber or bracing that extends into substructure masonry shall not be left in cofferdams or cribs.

Pumping from the interior of any foundation enclosure shall be done in a manner that will not carry concrete materials away.

All pumping required during the placing of concrete, or for a period of at least 24 hours thereafter, shall utilize a suitable sump located outside the concrete forms. Pumping to dewater a sealed cofferdam shall not start until the seal has set sufficiently to withstand the hydrostatic pressure.

Cofferdams or cribs, and all sheeting and bracing shall be removed after completion of the substructure. Removal shall not disturb or mar finished masonry.

F. EMBANKMENT

1. Foundation Preparation. Site preparation including topsoil salvage work shall conform to the requirements as specified herein.

After topsoil stripping, all areas which will be receiving fill shall be scarified to a depth of 6 inches, watered, and compacted in conjunction with the first lift of new fill. When embankments are to be placed on a hillside, or where new fill is to be placed against existing embankment, the slope of the original hillside, or old fill respectively, shall be benched or stepped by cutting into it horizontally, for a minimum distance of 12 inches. These measures will provide a secure bond between the new and existing materials. Each bench shall be cut as close to the one below as the slope of the ground will permit. Materials thus cut out of the benches shall be incorporated into the new fill. Costs for constructing the benches shall be included in the price for the work performed herein, and no additional compensation will be allowed.

2. Placement. Embankment and backfill materials shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the Engineer. Fill materials shall not be placed upon frozen surfaces, nor shall it contain snow, ice or frozen materials.

Embankment shall be constructed of materials excavated on-site or borrowed materials from approved sources. Embankment shall be placed to the lines and grades indicated in uniform layers as required to obtain the specified compaction throughout the embankment. Each layer of embankment shall be completed, leveled, compacted, and tested, if required, before the succeeding layer is placed. The embankment surface is to be kept level and uniform at all times.

Embankment material shall not be excessively dry or wet when placed. If necessary, the Contractor shall manipulate the material as required to assure that compaction will be performed at or near the optimum moisture content given in the moisture-density curve. Jetting or ponding of the backfill materials will not be allowed.

The site shall be adequately dewatered prior to placing any embankment or attempting compaction such that ground water is not intruding into the material.

If it should become necessary because of weather or other conditions to suspend grading operations, the entire area worked upon shall be bladed until smooth, free of depressions and ruts, and crowned so no water can collect or be impounded.

Areas inaccessible to rollers shall be compacted by hand or mechanical tampers or other means until the density conforms to adjacent embankment, compacted in accordance with these Specifications.

Whenever the surface of a proposed cut or the site of an embankment is frozen or is covered with snow or ice sufficient to impair the stability of the work, the frozen earth material and snow and ice must be removed at no cost to the Owner. Work of this nature shall be completed at least 300 feet in advance of the excavation and placing of the embankment material. Frozen excavation or that lying under a blanket of snow of such extent as to preclude its placement in the embankment will be considered cause for suspending grading operations.

Embankment constructed during the winter shall be refinished to grade, cross-section, and compaction requirements after the frost is out of the ground and the embankment is in suitable condition for work.

3. Structure Embankment. Adjacent to structures, backfill materials shall be placed in a manner which will prevent damage to the structures and allow the structures to assume the loads from fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure. The maximum size of rock fragments in backfill adjacent to the structure shall be 2 inches.

   Backfill materials shall not be placed and compacted against any structure for a minimum period of 14 days after the placement of concrete, or until 90% of design strength has been attained through testing.

G. REMOVAL AND PLACEMENT OF DEFECTIVE FILL - Embankment and backfill materials not conforming to the density and moisture requirements shall be reworked until the requirements are achieved or removed and replaced by acceptable fill. The replacement fill, foundations, abutment and fill surfaces upon which it is placed shall conform to all requirements of specifications for Foundation Preparation, Placement, Moisture and Density Requirements contained herein.

H. MOISTURE AND DENSITY REQUIREMENTS - Each layer of embankment and backfill material shall be compacted until the in-place density exceeds 85% of its maximum dry density. In no case will compaction be less than that of adjacent undisturbed material. For roadway and structure embankments, compaction shall be 95% of maximum. For excavation cuts, compaction shall be equal to or greater than that of the adjacent undisturbed material. Cost of compaction, rolling, and watering is incidental to the earthwork bid item listed on the Proposal.

Water required shall be sufficient to obtain optimum moisture content plus or minus a minimum 3% as determined by AASHTO T-99, ASTM D 698, Standard Proctor Method A, B, C, or D, as applicable. The Engineer may periodically measure the degree of compaction (field density) during embankment construction. Measurements will be based on optimum moisture and maximum density curves submitted.

Field or in-place density refers to the dry density expressed in pounds per cubic foot of a layer of compacted material in place at the site as determined by a sample representative of the compacted layer. The field density shall be determined in accordance with AASHTO T-147, AASHTO T-181, ASTM D 1556,or ASTM D 2167.

I. HAUL - When constructing embankments or wasting, the cost of hauling shall be included in the Contract unit price bid for earthwork item on the Proposal.

J. FINE GRADING - After the earthwork has been substantially completed and after all underground utilities, drainage facilities, etc. have been installed or adjusted to grade, the embankment shall be brought to the lines, grades, and cross-sections shown on the Drawings, and compacted to the required density.

The Contractor shall increase heights above grade and increase widths as necessary to allow for settlement, consolidation, or compaction. Otherwise construction tolerances for earthwork shall be $\pm$ 0.2 feet of line and grade.

Side slopes shall be finished to a reasonable uniform but rough surface that blends to the contours of surrounding undisturbed ground. Smooth surfaces shall be scarified perpendicular to the slope of the ground.

K. TOPSOILING AND CLEANUP - After fine grading work is accepted, salvaged topsoil shall be replaced to cover those areas to be seeded as designated on the Drawings and according to Subsection 310.00, Cover Soil.

The Contractor shall remove all tools, equipment, excess materials, debris, etc. from the vicinity of the work.

SUBSECTION 206.00: HAUL

206.01 GENERAL

A. DESCRIPTION - This work shall consist of loading and hauling material excavated from its original location to its final location in the work. It shall include dumping hauled material in a location that will facilitate placement under the Waste Pile Disposal work item, watering for dust control, and the installation and removal of temporary facilities such as fence, culverts, access/haul roads, etc. The work shall also include all signing and traffic control, including flagmen if necessary. This work also applies to hauling of cover soil and other miscellaneous excavated materials, where necessary.

The material which shall be loaded and hauled is that material which is excavated as spoils material in Subsection 220.00, Waste Pile Disposal.

B. SUBMITTALS - The following submittals for haul will be required in accordance with the Supplementary Conditions:

* A Traffic Control Plan as specified in the Supplementary Conditions.
* Specifications, layout, and location of weighing equipment.
* Sample weigh ticket to be used.
* Certified empty weights and identifying number for each haul vehicle to be used.

206.02 MATERIALS

Materials for this item are covered under Construction Requirements.

206.03 CONSTRUCTION REQUIREMENTS

A. HAUL - All materials to be hauled shall be removed from their original location and placed in trucks or other suitable equipment capable of transporting the material without spillage. All vehicles shall travel on the designated haul routes in such a manner as to minimize damage to the surrounding vegetated areas.

Haul routes shall be those designated on the Drawings. Proposed haul routes not shown on the Drawings must be approved in writing by the Engineer prior to construction.

B. WEIGHING - All material to be hauled shall be weighed if weighing is required by the Proposal and/or Special Provisions for basis of measurement and payment. The Contractor shall provide and erect a scale suitable for weighing entire haul vehicles or axles thereof to an accurate weight of 0.5% of the total weight. The Contractor shall furnish a competent scale tender and provide certified weigh tickets for each load. The scale and weighing operation shall be easily verifiable for accuracy by the Engineer. The Contractor shall also furnish six 50-lb. weights for scale calibration.

SUBSECTION 501.00: MOBILIZATION

501.01 GENERAL

Mobilization shall consist of preparatory work and operations performed by the Contractor, including, but not limited to, those necessary for the transportation and movement of personnel, equipment, supplies, and incidentals to the project site; for necessary permits; for the establishment of all offices and other facilities necessary for work on the project; for premium on contract bonds, unless a lump sum bid item for contract bond is included in the contract; for insurance for the contract; and for other work and operations that must be performed or costs incurred before beginning work on the various items on the project site. Mobilization costs for subcontracted work shall be considered to be included.

501.02 MATERIALS

As part of mobilization, the Contractor shall provide a safe storage area for material intended for the work until it has been incorporated in the completed project.

501.03 CONSTRUCTION REQUIREMENTS

Not applicable.